

What is Claimed Is:

- 1 1. A microfluidic device comprising:
2 A) a substrate and
3 B) a channel on the substrate, the channel comprising a side wall,
4 wherein the side wall comprises a polymeric material, the side wall is formed by
5 deposition of a plurality of microdroplets comprising the polymeric material from
6 a nozzle.
- 1 2. The microfluidic device of claim 1 wherein the channel further
2 comprises a cover comprising the polymeric material.
- 1 3. The microfluidic device of claim 1 wherein the channel also
2 comprises a bottom comprising the polymeric material.
- 1 4. The microfluidic device of claim 1 wherein the device further
2 comprises an overhang structure comprising the polymeric material, wherein the
3 overhang structure comprises a base positioned over the substrate and an
4 extension extending from an end of the base opposite the substrate, the extension
5 being substantially parallel to the substrate.
- 1 5. The microfluidic device of claim 1 wherein the microdroplets of the
2 polymeric material comprise a polymer solution, a polymer suspension, or a
3 combination thereof.

1 6. An injection molding master for fabricating a molded microfluidic
2 device, the master comprising:

3 A) a substrate and

4 B) a channel on the substrate, the channel comprising a side wall,
5 wherein the side wall comprises a polymeric material, the side wall is formed by
6 deposition of a plurality of microdroplets comprising the polymeric material from
7 a nozzle.

1 7. The master of claim 6 wherein the master reflects a positive
2 representation of the molded microfluidic device.

1 8. The master of claim 6 wherein the master reflects a negative
2 representation of the molded microfluidic device.

1 9. A process of making a pattern of microfluidic device features on a
2 substrate, the process comprising:

3 forming said pattern by emitting microdroplets of a polymeric material
4 from a nozzle onto the substrate to form a deposited pattern on the substrate.

1 10. The process of claim 9 wherein the pattern of microfluidic device
2 features on said substrate forms an injection molding master for producing a
3 molded microfluidic device, and the process further comprises:

4 curing the polymeric material forming said deposited pattern to form the
5 injection molding master.

1 11. The process of claim 10 wherein the deposited pattern is a positive
2 representation of the molded microfluidic device.

1 12. The process of claim 11 further comprising electroforming a metal
2 onto the injection molding master to form a metallic mold.

1 13. The process of claim 10 wherein said deposited pattern is a negative
2 representation of the molded microfluidic device.

1 14. The process of claim 9 wherein emitting the microdroplets of
2 polymeric material is performed by an ink-jet printer.

1 15. The process of claim 9 wherein the substrate is mounted on a
2 translation device, wherein the translation device moves the substrate to form the
3 pattern of microfluidic features from the microdroplets of polymeric materials
4 emitted from the nozzle.

1 16. The process of claim 9 comprising forming an overhang structure in
2 the pattern of microfluidic features, forming the overhang structure comprises
3 forming a base positioned over the substrate and an extension extending from an
4 end of the base opposite the substrate, the extension being substantially parallel to
5 the substrate.

1 17. The process of claim 9 comprising forming a channel in the pattern
2 of microfluidic features.

1 18. The process of claim 17 comprising forming a channel bottom, a
2 channel sidewall and a channel cover.

1 19. The process of 18 wherein the sidewall and the cover are formed
2 from the same polymeric material.

1 20. The process of claim 19 wherein the bottom, the sidewall and the
2 cover are formed from the same polymeric material.

1 21. The process of claim 9 wherein forming the deposited pattern
2 comprises depositing the microdroplets of polymeric material in a first area and
3 depositing microdroplets of a second polymeric material from the nozzle in a
4 second area of the substrate.

1 22. The process of claim 21 wherein the deposited microdroplets of
2 polymeric material in the first area and the second polymeric material comprise
3 the same polymeric material.

1 23. The process of claim 21 wherein the microdroplets of polymeric
2 material deposited in the first area are not soluble in a solvent that solubilizes the
3 second polymeric material.

1 24. The process of claim 21 further comprising a step removing the
2 first polymeric material.

1 25. A microfluidic device comprising a device substrate and a channel,
2 wherein the channel comprises a bottom and a sidewall, said device formed by

3 A) preparing an injection molding mmaster, wherein preparing the injection
4 molding master comprises forming a negative impression of the channel by
5 emitting microdroplets of a polymeric material onto a injection molding master
6 substrate;

7 B) injecting a second polymeric material into the injection molding master;

8 C) curing the second polymeric material to form the microfluidic device;

9 and

10 D) removing the microfluidic device from the injection molding model.